River Mile 10.9 Removal Action Air Quality Monitoring: Modifications to Perimeter Air Monitoring Plan

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DATE: September 23, 2013

PROJECT NUMBER: 474468.RA.PM.01

Summary

This technical memorandum presents a summary of the air samples collected to date pursuant to the EPA-approved *River Mile 10.9 Removal Action Perimeter Air Monitoring Plan, Lower Passaic River Study Area*, dated July 8, 2013 (the "PAMP"). Pursuant to the EPA-approved PAMP, air monitoring may be reduced prior to the completion of dredging and may be discontinued during the capping portion of the project with EPA-approval. Given the characteristics of the RM 10.9 chemicals of potential concern (COPCs), it was expected and the air monitoring data have confirmed that the RM 10.9 dredging is not a source of COPC air emissions.

This technical memorandum documents the results of air sampling results collected prior to and during dredging conducted through September 3, 2013. These data support immediate reductions in sampling frequency for future dredging. Additionally, air samples are now being collected while dredging is occurring in an area of elevated sediment COPC concentrations (zones 28+00 to 21+00). These air monitoring data are expected by September 30. If these data continue to indicate that dredging operations are not a source of COPC air emissions, that will provide additional support for entirely discontinuing COPC, H2S, and volatile organic compound (VOC) air monitoring during the capping of RM 10.9 Removal Area.

Introduction

The primary objective of the PAMP is to monitor air quality and measure the quantity of COPCs associated with the dredging and capping. RM 10.9 COPCs, which include dioxins/furans and PCBs, have low vapor pressures and adhere tightly to the sediment particles, and therefore have low to negligible vapor emission potential. Moreover, VOCs were not detected in the sediment during characterization and no VOCs have been monitored to date during real-time monitoring. Furthermore, since the sediment is wet and remains moist throughout the dredging process, the potential for dust generation during dredging operations is extremely low to negligible. Notwithstanding, chemical sampling has been performed at the direction of EPA to ensure and verify that the dredged sediment is not a potential source of COPCs to the air.

Following completion of dredging, the Removal Area will be capped. During capping, there will be no potential chemical transport pathway to the air as sediment is no longer being disturbed and will also be wet or submerged. Based on the properties of the COPCs alone, air sampling is not necessary during

capping. However, the COPC air monitoring results demonstrate both (1) no release of COPCs to air during dredging and (2) provide an even stronger case to eliminate COPC sampling during capping.

RM 10.9 Air Monitoring Analytical Results

The air monitoring program includes both real-time and 24-hour composite sampling. The real-time monitoring data are collected every minute for particulates (dust), hydrogen sulfide, and VOCs and are immediately uploaded to a web-portal where they can be viewed. The composite samples are collected over a 24-hour period to monitor for the presence of COPCs that would adhere to dust particles. These samples are being sent for expedited laboratory analysis of 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (2,3,7,8-TCDD), PCB Aroclors, and mercury.

Air samples were taken from one on-river station (IRS#1) and four park monitoring stations (PMS#1, PMS#2, PMS#3, Mobile #1 [real-time only]) as shown in Figure 1. To date, 124 composite samples for COPC analysis were collected as shown in Table 1. The 24-hour composite samples were collected from the four fixed stations (IRS#1, PMS#1, PMS#3, and PMS#3) during dredging operations. Currently, dredging is occurring in zones of elevated sediment COPC concentrations (zones 28+00 to 21+00). For two of these dredging days, Mercury, 2,3,7,8-TCDD and PCB Aroclors were sampled simultaneously in all but IRS#1 at which samples were collected for Mercury and 2,3,7,8-TCDD one day, and Mercury and PCB Aroclors the next day. Prior to reaching zones 28+00 to 21+00, sampling was conducted on a daily rotating scheme as follows: Day 1 – Mercury (including particulate matter PM-10), Day 2 – 2,3,7,8-TCDD, Day 3 – PCB Aroclors, Day 4 – Mercury (including particulate matter PM-10), Day 5 – TCDD, etc. While the proposed reduction in air sampling is being evaluated by USEPA, this sampling scheme will be resumed after the two days of intensive sampling is completed.

Throughout the dredging activities, real-time 1-minute readings continue to be collected 24-hours per day, 7 days a week, to analyse for particulates (dust), hydrogen sulfide, and volatile organic compounds (VOCs). These readings are recorded both during and outside dredging operations. There have been no elevated readings for any of these parameters since dredging resumed on September 19.

The results of the air monitoring program during dredging can be summarized as follows:

- No exceedances of real-time air indicator criteria
- All COPC analytical results were either non-detect or several orders of magnitude below the conservative risk based action levels.
  - All Mercury results were non-detect with the detection limit 4 orders of magnitude below the most conservative (residential) risk based action level
  - Over 40 percent of the PCB results were non-detect and detected values were 2 to 3 orders of magnitude below the most conservative (residential) risk based action level
  - All 2,3,7,8-TCDD results were non-detect or 4 to 5 orders of magnitude below the most conservative (residential) risk based action level
- Concentrations measured were indistinguishable from those measured prior to dredging.

Conclusions and Recommendations

An extensive amount of data has been collected to characterize air quality during the RM 10.9 dredging. These data support the finding that chemicals associated with the dredged sediment have not impacted air quality in the park adjacent to the Removal Area.

Given these findings, CH2M Hill recommends that the CPG request EPA-approval to reduce the frequency of COPC air monitoring to one full round at each sampling station every 7 dredging days beginning on September 24, rather than the daily monitoring that is currently being conducted. As a conservative measure, no changes are proposed to the real-time monitoring during dredging operations.

In addition, since there is no mechanism for air phase transport of chemicals from RM 10.9 sediments to receptor during capping operations, CH2M Hill further recommends EPA-approval to discontinue all 24-hour composite COPC sampling and real-time chemical monitoring (hydrogen sulphide and VOCs) during the upcoming capping operations. The only monitoring that is technically warranted during capping is real-time dust monitoring to ensure that the cap materials (sand and activated carbon) are not negatively impacting air quality.

Table 1a. RM 10.9 Air Concentration Data: Pre-Dredge Data

Station ID	Sample Collection Start Date	COPC	Air Concentration* (ug/m3)	Qualifier	Air Indicator Criteria (ug/m3)	Exceedance of Air Indicator Criteria	Magnitude Below Air Indicator Criteria
PMS-1	7/30/2013	Mercury	ND (4.2E-04)		2.4E+00	no	1.8E-04
IRS-1	7/30/2013	Mercury	ND (4.2E-04)		2.4E+00	no	1.8E-04
IRS-1	7/31/2013	Mercury	ND (4.2E-04)		2.4E+00	no	1.8E-04
PMS-2	7/31/2013	Mercury	ND (4.2E-04)		2.4E+00	no	1.8E-04
PMS-1	7/31/2013	PCB	8.3E-04	J AP	1.1E-01	no	7.5E-03
PMS-1	7/30/2013	PCB	8.6E-04	J AP	1.1E-01	no	7.8E-03
PMS-2	7/31/2013	PCB	1.0E-03	J AP	1.1E-01	no	9.4E-03
IRS-1	7/30/2013	PCB	1.3E-03	J AP	1.1E-01	no	1.2E-02
PMS-1	7/30/2013	TCDD	3.0E-09	Q J	2.4E-05	no	1.3E-04
PMS-1	7/31/2013	TCDD	4.4E-09	Q J	2.4E-05	no	1.8E-04
IRS-1	7/31/2013	TCDD	6.6E-09	Q J	2.4E-05	no	2.7E-04
PMS-2	7/31/2013	TCDD	7.2E-09	Q J	2.4E-05	no	3.0E-04

Notes: *Unvalidated Data

Key: AP = Altered pattern
J = Estimated result. Result is less than the reporting limit.
ND = Not detected above the (Method Detection Limit)
PCB = Polychlorinated biphenyl
Q = Estimated maximum possible concentration (EMPC).
TCDD = 2,3,7,8-Tetrachlorodibenzo-p-Dioxin
ug/m^3 = microgram per cubic meter

Table 1b. RM 10.9 Air Concentration Data: Mercury During Dredging

Station ID	Sample Collection Start Date	COPC	Air Concentration* (ug/m3)	Qualifier	Air Indicator Criteria (ug/m3)	Exceedance of Air Indicator Criteria	Magnitude Below Air Indicator Criteria
PMS-1	8/2/2013	Mercury	ND (4.2E-04)		2.4E+00	no	1.8E-04
IRS-1	8/2/2013	Mercury	ND (4.2E-04)		2.4E+00	no	1.8E-04
PMS-3	8/2/2013	Mercury	ND (4.2E-04)		2.4E+00	no	1.8E-04
PMS-2	8/5/2013	Mercury	ND (4.2E-04)		2.4E+00	no	1.8E-04
PMS-3	8/5/2013	Mercury	ND (4.2E-04)		2.4E+00	no	1.8E-04
PMS-1	8/5/2013	Mercury	ND (4.2E-04)		2.4E+00	no	1.8E-04
IRS-1	8/5/2013	Mercury	ND (4.2E-04)		2.4E+00	no	1.8E-04
PMS-2	8/9/2013	Mercury	ND (4.2E-04)		2.4E+00	no	1.8E-04
PMS-1	8/9/2013	Mercury	ND (4.2E-04)		2.4E+00	no	1.8E-04
PMS-3	8/9/2013	Mercury	ND (4.2E-04)		2.4E+00	no	1.8E-04
IRS-1	8/9/2013	Mercury	ND (4.2E-04)		2.4E+00	no	1.8E-04
PMS-1	8/12/2013	Mercury	ND (4.2E-04)		2.4E+00	no	1.8E-04
PMS-3	8/12/2013	Mercury	ND (4.2E-04)		2.4E+00	no	1.8E-04
PMS-2	8/12/2013	Mercury	ND (4.2E-04)		2.4E+00	no	1.8E-04
IRS-1	8/12/2013	Mercury	ND (4.2E-04)		2.4E+00	no	1.8E-04
PMS-1	8/13/2013	Mercury	ND (4.2E-04)		2.4E+00	no	1.8E-04
PMS-3	8/13/2013	Mercury	ND (4.2E-04)		2.4E+00	no	1.8E-04
PMS-2	8/13/2013	Mercury	ND (4.2E-04)		2.4E+00	no	1.8E-04
IRS-1	8/13/2013	Mercury	ND (4.2E-04)		2.4E+00	no	1.8E-04
PMS-1	8/14/2013	Mercury	ND (4.2E-04)		2.4E+00	no	1.8E-04
PMS-3	8/14/2013	Mercury	ND (4.2E-04)		2.4E+00	no	1.8E-04
PMS-2	8/14/2013	Mercury	ND (4.2E-04)		2.4E+00	no	1.8E-04
IRS-1	8/14/2013	Mercury	ND (4.2E-04)		2.4E+00	no	1.8E-04
PMS-1	8/19/2013	Mercury	ND (4.2E-04)		2.4E+00	no	1.8E-04
PMS-2	8/19/2013	Mercury	ND (4.2E-04)		2.4E+00	no	1.8E-04
PMS-3	8/19/2013	Mercury	ND (4.2E-04)		2.4E+00	no	1.8E-04
IRS-1	8/19/2013	Mercury	ND (4.2E-04)		2.4E+00	no	1.8E-04
PMS-1	8/21/2013	Mercury	ND (4.2E-04)		2.4E+00	no	1.8E-04
PMS-3	8/21/2013	Mercury	ND (4.2E-04)		2.4E+00	no	1.8E-04
PMS-2	8/21/2013	Mercury	ND (4.2E-04)		2.4E+00	no	1.8E-04
IRS-1	8/21/2013	Mercury	ND (4.2E-04)		2.4E+00	no	1.8E-04
PMS-1	8/26/2013	Mercury	ND (4.2E-04)		2.4E+00	no	1.8E-04
PMS-2	8/26/2013	Mercury	ND (4.2E-04)		2.4E+00	no	1.8E-04
PMS-3	8/26/2013	Mercury	ND (4.2E-04)		2.4E+00	no	1.8E-04
IRS-1	8/26/2013	Mercury	ND (4.2E-04)		2.4E+00	no	1.8E-04
PMS-1	8/29/2013	Mercury	ND (4.2E-04)		2.4E+00	no	1.8E-04

Station ID	Sample Collection Start Date	COPC	Air Concentration* (ug/m3)	Qualifier	Air Indicator Criteria (ug/m3)	Exceedance of Air Indicator Criteria	Magnitude Below Air Indicator Criteria
PMS-2	8/29/2013	Mercury	ND (4.2E-04)		2.4E+00	no	1.8E-04
PMS-3	8/29/2013	Mercury	ND (4.2E-04)		2.4E+00	no	1.8E-04
IRS-1	8/29/2013	Mercury	ND (4.2E-04)		2.4E+00	no	1.8E-04

Notes: *Unvalidated Data

Key: ND = Not detected above the (Method Detection Limit)

ug/m^3 = microgram per cubic meter

Table 1c. RM 10.9 Air Concentration Data: PCBs During Dredging

Station ID	Sample Collection Start Date	COPC	Air Concentration* (ug/m3)	Qualifier	Air Indicator Criteria (ug/m3)	Exceedance of Air Indicator Criteria	Magnitude Below Air Indicator Criteria
PMS-3	8/3/2013	PCB	ND (8.6E-04)		1.1E-01	no	3.8E-03
PMS-1	8/3/2013	PCB	ND (8.6E-04)		1.1E-01	no	3.8E-03
PMS-2	8/5/2013	PCB	ND (8.6E-04)		1.1E-01	no	3.8E-03
PMS-3	8/5/2013	PCB	ND (8.6E-04)		1.1E-01	no	3.8E-03
PMS-2	8/9/2013	PCB	ND (8.6E-04)		1.1E-01	no	3.8E-03
PMS-1	8/9/2013	PCB	ND (8.6E-04)		1.1E-01	no	3.8E-03
PMS-3	8/9/2013	PCB	ND (8.6E-04)		1.1E-01	no	3.8E-03
IRS-1	8/9/2013	PCB	ND (8.6E-04)		1.1E-01	no	3.8E-03
PMS-1	8/13/2013	PCB	ND (8.6E-04)		1.1E-01	no	3.8E-03
PMS-3	8/13/2013	PCB	ND (8.6E-04)		1.1E-01	no	3.8E-03
IRS-1	8/13/2013	PCB	ND (8.6E-04)		1.1E-01	no	3.8E-03
PMS-2	8/14/2013	PCB	ND (8.6E-04)		1.1E-01	no	3.8E-03
PMS-3	8/19/2013	PCB	ND (8.6E-04)		1.1E-01	no	3.8E-03
PMS-2	8/20/2013	PCB	ND (8.6E-04)		1.1E-01	no	3.8E-03
PMS-3	8/20/2013	PCB	ND (8.6E-04)		1.1E-01	no	3.8E-03
PMS-2	8/30/2013	PCB	6.2E-04	J AP	1.1E-01	no	5.7E-03
PMS-1	8/19/2013	PCB	6.3E-04	J AP	1.1E-01	no	5.7E-03
IRS-1	8/2/2013	PCB	6.3E-04	J AP	1.1E-01	no	5.7E-03
PMS-3	8/21/2013	PCB	6.8E-04	J AP	1.1E-01	no	6.1E-03
PMS-3	8/30/2013	PCB	7.0E-04	J AP	1.1E-01	no	6.4E-03
PMS-1	8/30/2013	PCB	7.5E-04	J AP	1.1E-01	no	6.8E-03
IRS-1	8/30/2013	PCB	8.2E-04	J AP	1.1E-01	no	7.5E-03
PMS-2	8/27/2013	PCB	8.3E-04	J AP	1.1E-01	no	7.5E-03
PMS-1	8/21/2013	PCB	8.6E-04	J AP	1.1E-01	no	7.8E-03
PMS-2	8/21/2013	PCB	8.7E-04	J AP	1.1E-01	no	7.9E-03
PMS-1	8/12/2013	PCB	9.2E-04	J AP	1.1E-01	no	8.4E-03
PMS-3	8/27/2013	PCB	9.5E-04	J AP	1.1E-01	no	8.6E-03
PMS-1	8/20/2013	PCB	9.7E-04	J AP	1.1E-01	no	8.8E-03
PMS-3	8/12/2013	PCB	9.8E-04	J AP	1.1E-01	no	8.9E-03
PMS-2	8/12/2013	PCB	1.0E-03	J AP	1.1E-01	no	9.4E-03
PMS-2	8/2/2013	PCB	1.0E-03	J AP	1.1E-01	no	9.5E-03
PMS-1	8/27/2013	PCB	1.0E-03	J AP	1.1E-01	no	9.5E-03
IRS-1	8/20/2013	PCB	1.3E-03	J AP	1.1E-01	no	1.2E-02
IRS-1	8/21/2013	PCB	1.3E-03	J AP	1.1E-01	no	1.2E-02
IRS-1	8/27/2013	PCB	1.4E-03	J AP	1.1E-01	no	1.2E-02

Notes: *Unvalidated Data

Key: AP = Altered pattern
J = Estimated result. Result is less than the reporting limit.
ND = Not detected above the (Method Detection Limit)
PCB = Polychlorinated biphenyl
ug/m^3 = microgram per cubic meter

Table 1d. RM 10.9 Air Concentration Data: TCDD During Dredging

Station ID	Sample Collection Start Date	COPC	Air Concentration* (ug/m3)	Qualifier	Air Indicator Criteria (ug/m3)	Exceedance of Air Indicator Criteria	Magnitude Below Air Indicator Criteria
PMS-3	8/9/2013	TCDD	ND (2.0E-10)		2.4E-05	no	8.3E-06
PMS-2	8/13/2013	TCDD	ND (2.0E-10)		2.4E-05	no	8.3E-06
PMS-2	8/23/2013	TCDD	ND (2.0E-10)		2.4E-05	no	8.3E-06
PMS-3	8/28/2013	TCDD	5.9E-10	Q J	2.4E-05	no	2.5E-05
PMS-3	8/5/2013	TCDD	6.4E-10	Q J	2.4E-05	no	2.7E-05
PMS-1	8/13/2013	TCDD	8.3E-10	Q J	2.4E-05	no	3.5E-05
PMS-3	8/3/2013	TCDD	1.1E-09	Q J	2.4E-05	no	4.5E-05
PMS-3	8/13/2013	TCDD	1.3E-09	Q J	2.4E-05	no	5.4E-05
PMS-2	8/21/2013	TCDD	1.6E-09	Q J	2.4E-05	no	6.8E-05
PMS-2	8/19/2013	TCDD	1.8E-09	Q J	2.4E-05	no	7.7E-05
PMS-2	8/2/2013	TCDD	2.0E-09	Q J	2.4E-05	no	8.4E-05
PMS-2	8/15/2013	TCDD	2.3E-09	Q J	2.4E-05	no	9.5E-05
IRS-1	8/15/2013	TCDD	2.3E-09	Q J	2.4E-05	no	9.6E-05
PMS-1	8/12/2013	TCDD	2.5E-09	Q J	2.4E-05	no	1.0E-04
PMS-2	8/9/2013	TCDD	2.5E-09	Q J	2.4E-05	no	1.1E-04
PMS-2	8/12/2013	TCDD	3.3E-09	Q J	2.4E-05	no	1.4E-04
PMS-3	8/19/2013	TCDD	3.4E-09	Q J	2.4E-05	no	1.4E-04
IRS-1	8/28/2013	TCDD	3.7E-09	Q J	2.4E-05	no	1.5E-04
IRS-1	8/5/2013	TCDD	3.7E-09	Q J	2.4E-05	no	1.5E-04
PMS-3	9/3/2013	TCDD	3.7E-09	Q J	2.4E-05	no	1.6E-04
PMS-3	8/12/2013	TCDD	4.0E-09	Q J	2.4E-05	no	1.7E-04
PMS-3	8/21/2013	TCDD	4.3E-09	Q J	2.4E-05	no	1.8E-04
PMS-3	8/15/2013	TCDD	4.5E-09	Q J	2.4E-05	no	1.9E-04
PMS-2	9/3/2013	TCDD	4.6E-09	Q J	2.4E-05	no	1.9E-04
PMS-1	8/9/2013	TCDD	4.9E-09	Q J	2.4E-05	no	2.0E-04
PMS-1	8/21/2013	TCDD	5.1E-09	Q J	2.4E-05	no	2.1E-04
PMS-3	8/23/2013	TCDD	5.8E-09	Q J	2.4E-05	no	2.4E-04
IRS-1	8/23/2013	TCDD	6.2E-09	Q J	2.4E-05	no	2.6E-04
PMS-1	8/23/2013	TCDD	6.3E-09	Q J	2.4E-05	no	2.6E-04
PMS-1	8/15/2013	TCDD	7.6E-09	Q J	2.4E-05	no	3.2E-04
PMS-1	8/5/2013	TCDD	8.5E-09	Q J	2.4E-05	no	3.5E-04
PMS-1	8/19/2013	TCDD	9.8E-09	Q J	2.4E-05	no	4.1E-04
IRS-1	9/3/2013	TCDD	1.0E-08	Q J	2.4E-05	no	4.3E-04
PMS-1	8/23/2013	TCDD	1.2E-08	Q J	2.4E-05	no	5.0E-04
IRS-1	8/19/2013	TCDD	1.2E-08	Q J	2.4E-05	no	5.2E-04
IRS-1	8/12/2013	TCDD	1.3E-08	Q J	2.4E-05	no	5.4E-04

PMS-1	9/3/2013	TCDD	1.4E-08	Q J	2.4E-05	no	6.0E-04
PMS-1	8/28/2013	TCDD	1.8E-08	Q J	2.4E-05	no	7.5E-04

Notes: *Unvalidated Data

Key: J = Estimated result. Result is less than the reporting limit.
ND = Not detected above the (Method Detection Limit)
Q = Estimated maximum possible concentration (EMPC).
TCDD = 2,3,7,8-Tetrachlorodibenzo-p-Dioxin
ug/m^3 = microgram per cubic meter

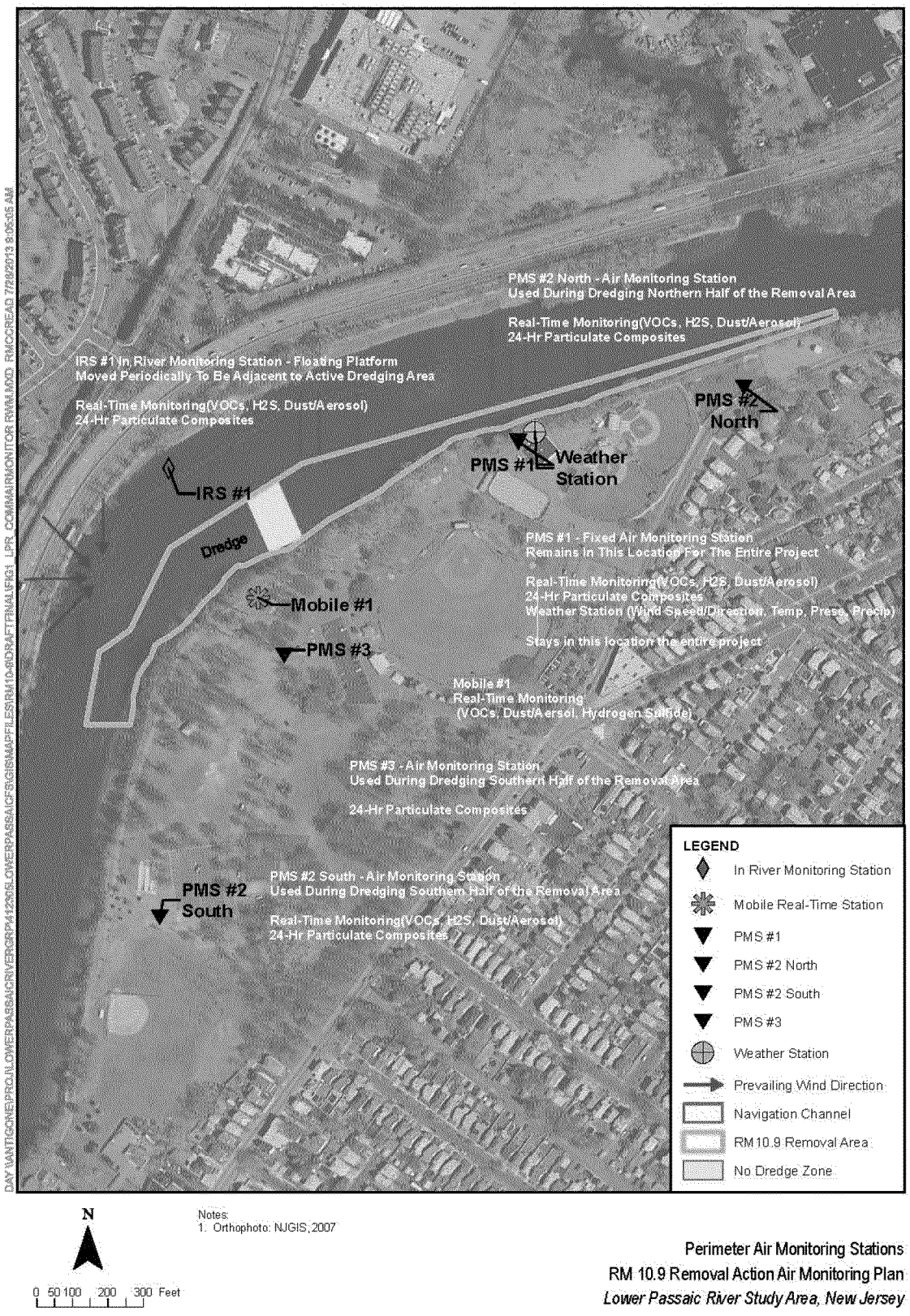

Figure 1. Perimeter Air Monitoring Stations